

City of Riverside Public Works Department

Update of the Integrated Master Plan for the Wastewater Collection and Treatment Facilities

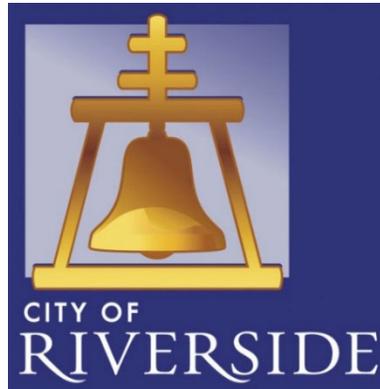
VOLUME 3: WASTEWATER COLLECTION SYSTEM

CHAPTER 7: CAPACITY EVALUATION AND PROPOSED IMPROVEMENTS

APPENDIX 7C: ACORN/ARLANZA TRUNK SEWER ANALYSIS

FINAL | June 2019





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and Treatment Facilities

VOLUME 3: WASTEWATER COLLECTION SYSTEM

CHAPTER 7: CAPACITY EVALUATION AND PROPOSED IMPROVEMENTS

APPENDIX 7C: ACORN/ARLANZA TRUNK SEWER ANALYSIS

Carollo Project No. 10495A00



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Section 1

PURPOSE

This report discusses the findings from the evaluation that Carollo conducted of the capacity and existing operations of the City A/A Trunk Sewer. The A/A Trunk Sewer is a 48-inch diameter sewer that conveys flow to the City's RWQCP. Figure 1 shows an overview of the A/A Trunk Sewer evaluation area within the RWQCP. The City is concerned that the current flow conditions are higher than the existing capacity of the A/A Trunk Sewer. Questions regarding the A/A Trunk Sewer capacity began when City staff noticed that the flow height in the A/A Trunk Sewer flows was close to the top of pipe at the metering station. Figure 2 shows the A/A Trunk Sewer almost full at the metering station on December 19, 2017 around 3:00 pm. The City requested an evaluation that includes the following tasks:

- Review of existing information.
- Inspection - with CCTV data to determine A/A Trunk Sewer's structural condition or potential blockages.
- Hydraulic analysis update based on concurrent flow and level data at A/A Trunk Sewer's metering station and RWQCP's headworks.

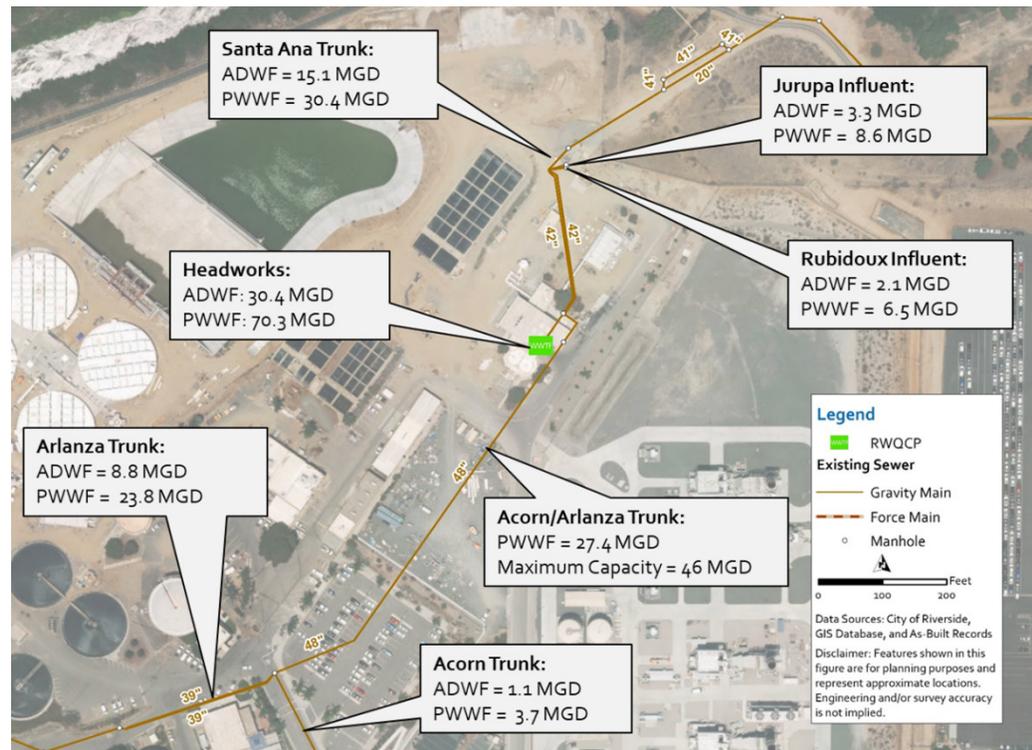


Figure 1 A/A Trunk Sewer Overview within the RWQCP



Figure 2 A/A Trunk Sewer Metering Station - December 19, 2017

Section 2

RECORD DRAWINGS

Record drawings were reviewed in order to understand the hydraulics conditions and flow levels at the RWQCP headworks. According to record drawing, the City's RWQCP headworks was designed to maintain a HGL of 710.34-feet at an influent flow rate of 70 mgd and maintain a HGL of 710.45-feet at an influent flow rate of 100 mgd. Under these flows the A/A trunk would surcharge by approximately 6-inches above the pipe crown elevation of approximately 709.86 feet. A copy of the City's RWQCP hydraulic profile is shown on Figure 3.

Note that the elevations above from the 1998 RWQCP hydraulic profile are different to those shown on the hydraulic profile for the recent plant expansion project. The reason for this is that for the 2012 design of the recently completed plant expansion project, the coordinates were changed to the NAD 83, California Coordinate System, Zone 6 using the North American Vertical Datum of 1988. This results in a 2.4 ft difference between the elevations shown on the 1998 hydraulic profile and those shown on the 2012 hydraulic profile. The conclusions from the analysis remain the same.

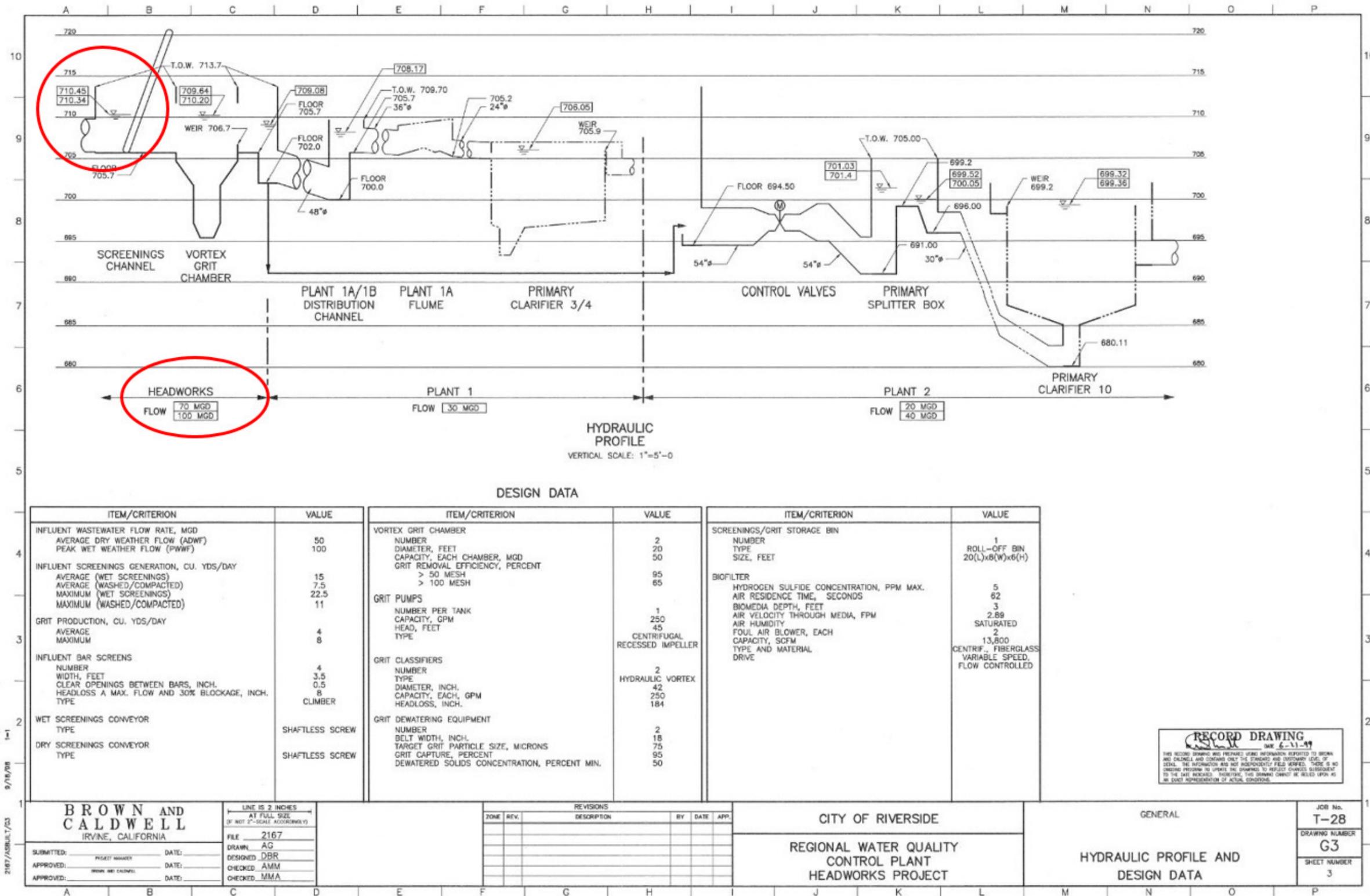


Figure 3 RWQCP Hydraulic Profile

Section 3

INSPECTION

As part of the evaluation, the City CCTV inspected the A/A Trunk Sewer to determine the overall condition and identify potential blockages. The CCTV report indicated that the A/A Trunk Sewer is in good condition. No significant blockages were identified along the A/A Trunk Sewer. A copy of the CCTV report is included in Attachment A.

Section 4

HYDRAULIC ANALYSIS

Carollo developed a hydraulic model of the City's wastewater collection system as described in Volume 3 Chapter 4, Collection System Facilities and Hydraulic Model, of the update to the Master Plan. The hydraulic model was used to evaluate the wastewater collection system capacity. Sewer deficiencies are based on the evaluation criteria described in Volume 3, Chapter 5, Planning Criteria and Design Flows, of the update to the Master Plan.

4.1 Initial Capacity Evaluation

The capacity analysis performed for Volume 3, Chapter 7, Capacity Evaluation and Proposed Improvements, of the update to the Master Plan indicated that the A/A Trunk Sewer exceeded the maximum HGL at 90 percent of the pipe diameter (maximum d/D greater than 0.9). Figure 4 shows the HGL profile of the A/A trunk sewer under existing PWWF conditions.

Even though the A/A Trunk Sewer exceeded 90 percent capacity, this did not mean it was deficient. In this case, a surcharged condition within a given pipeline was due to backwater effects created by HGL conditions at the headworks.

The modeling software used to develop the hydraulic model, InfoSWMM, calculates the maximum capacity for every pipe given pipe diameter and slope. In this case, the A/A trunk sewer has a calculated maximum capacity of 46 mgd. However, the meter station surcharges under existing PWWF (roughly 24.7 mgd) conditions (Figure 4). This indicates that the meter station surcharging may be caused by backwater effects created from the hydraulic grade conditions at the RWQCP's headworks. In order to evaluate this further, additional data was requested from the City to confirm how the HGL conditions at the headworks impacts the A/A Trunk Sewer. The additional data was used to revise the hydraulic model to simulate the head conditions at the RWQCP headworks to see if the model would replicate the elevated hydraulic grade observed in the filed by City staff.

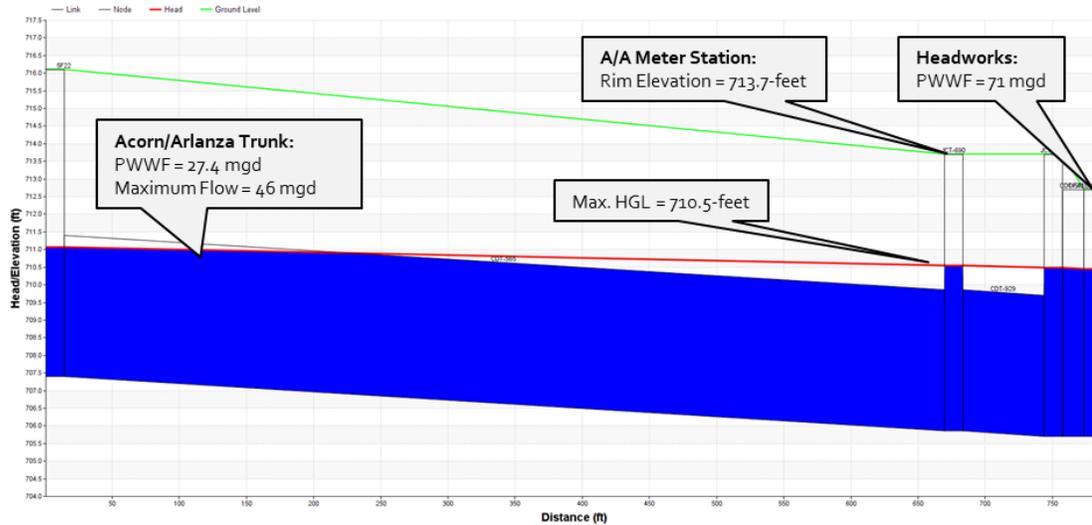


Figure 4 A/A Trunk Sewer HGL under existing PWWF Conditions

4.2 Additional Capacity Evaluation

The City collected flow and depth measurements at the meter station and headworks at two concurrent times on May 4, 2018. Table 1 summarizes the data collected by the City. The collected data was used to update the hydraulic model's depth (or stage) versus flow relationship curve at the simulated collection system headworks and is shown on Figure 5. Note that the initial depth versus flow relationship curve was based on record drawings. Figure 5 also compared model headworks flow elevations at varying flows with the depth versus flow relationship curve. The modeled depths match well compared to the developed curve.

Table 1 Measured Data - May 4, 2018

Time	A/A Metering Station			RW/CP Headworks		
	Flow (mgd)	Depth (ft)	HGL (ft)	Flow (mgd)	Depth (ft)	HGL (ft)
7:00	2.48	0.5	706.36	12.4	1.75	707.45
10:52	8.54	2.25	708.11	25.69	3.25	708.95

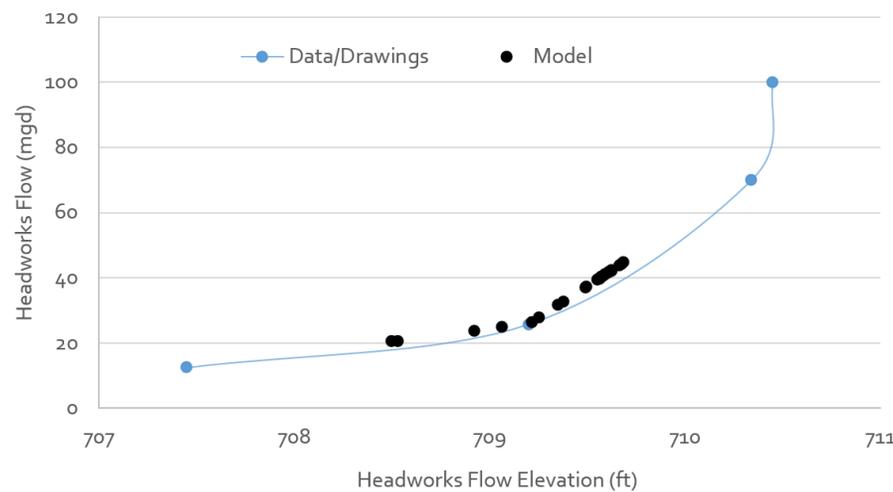


Figure 5 Model Headworks Depth versus Flow Relationship Curve

The modeled results at the meter station were compared to the measured depth. Measurements 1 and 2 were used to confirm the updated depth versus flow relationship curve. For each event the measured A/A trunk sewer flow was loaded at the A/A junction structure, while the difference between the measured headworks and A/A trunk sewer flows was loaded upstream along the Santa Ana Sewer Line. The modeled meter box depth matched well to the measured results for measurements 1 and 2. Figure 6 shows the HGL of the A/A trunk sewer with a flow of 12.8 mgd. The level HGL indicates that the backwater effects are caused by the headworks, represented by the outfall in the model. Therefore, the surcharging is a result of the backwater effects caused by the hydraulic grade conditions at the headworks.

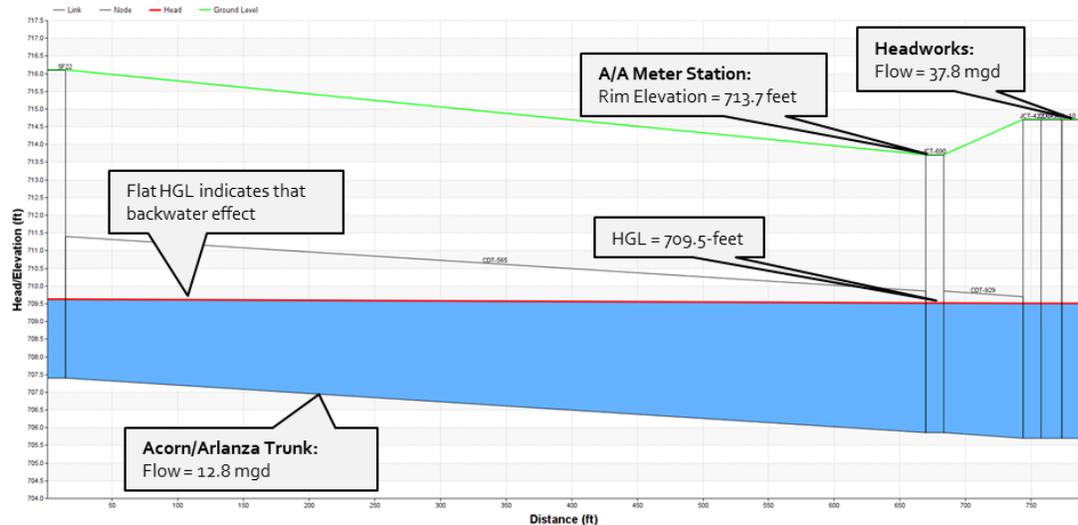


Figure 6 A/A Trunk Sewer HGL at 12.8 mgd

Once the flow depth versus flow curve was confirmed, the model was re-run with a flow of 46 mgd through the A/A trunk sewer and the flow loaded along the Santa Ana Sewer Line was reduced until the A/A trunk sewer no longer experienced surcharge conditions. This approach was unable to produce observed surcharging conditions as seen by City staff in the field. To capture non-surge conditions along the A/A trunk sewer the modeled headworks floor elevation was lowered by 1-foot. Figure 7 shows the A/A trunk sewer's HGL under these assumptions. The HGL profile is no longer flat, but parallel to the trunk sewer. This confirms that the A/A trunk sewer surcharge conditions are caused by downstream boundary conditions. To lower the flow levels in the A/A trunk sewer and avoid the existing surcharge at the metering station, the City would have to lower the HGL conditions at the headworks. The headworks project includes replacing the barscreens with Multirake barscreens, which may lower the upstream HGL a few inches. However, to lower the HGL by a foot will require completely a new headworks and modifications to downstream facilities, which is not included in the current CIP. Up sizing the A/A Trunk will not improve the HGL.

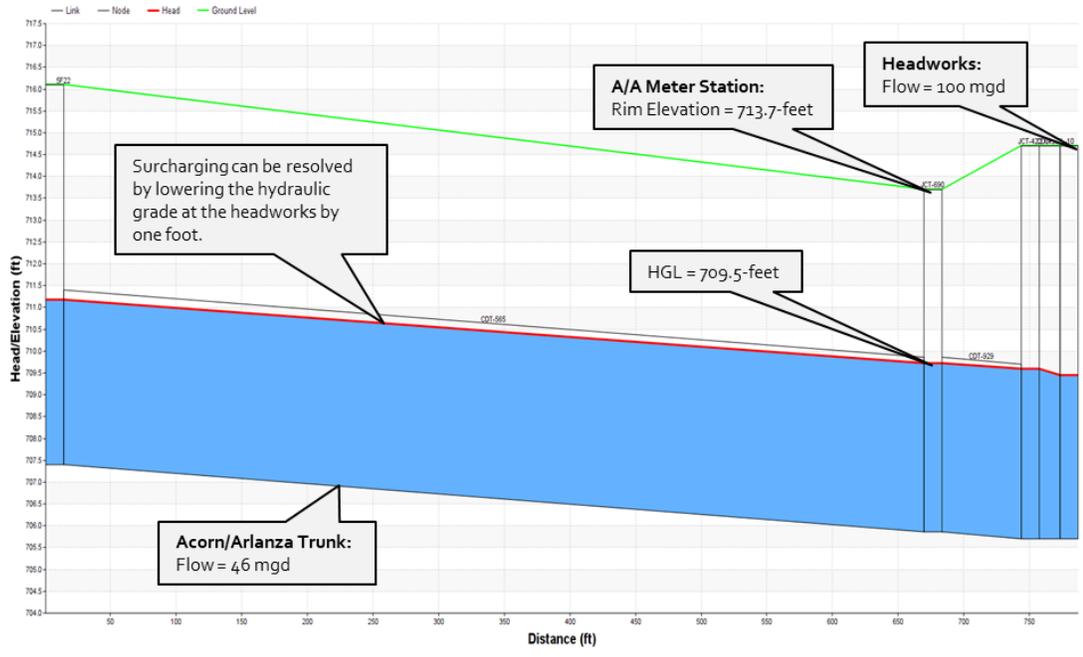


Figure 7 A/A Trunk Sewer HGL at 46 mgd and Headworks Lower by 1-foot

Section 5 CONCLUSION

Based on the evaluation presented above, the following conclusions can be made:

- Review of existing information indicated that the headworks was designed to have a HGL of 710.34 at 70 mgd and 701.45 at 100 mgd, approximately 6-inches above A/A trunk crown.
- The inspection indicated that the A/A trunk sewer was in good condition and did not have blockages.
- The initial hydraulic analysis showed that the 48-inch A/A trunk sewer has sufficient capacity for existing PWWF conditions and that the surcharge conditions are caused by backwater effects created by hydraulic boundary conditions at the RWQCP headworks.
- The updated hydraulic analysis confirmed that the A/A trunk sewer has sufficient capacity for existing PWWF conditions and that the surcharge conditions are caused by backwater effects created by hydraulic boundary conditions at the RWQCP headworks.
- The hydraulic grade conditions at the headworks will need to be lowered by approximately 1-foot in order to mitigate surcharge conditions along the A/A trunk sewer.

Attachment A
CCTV REPORT

CUES, Inc.
 3600 Rio Vista Avenue
 Orlando, FL 32805
 Phone: 407-849-0190
 Fax: 407-425-1569



Observations by Inspections

SITE DATA

Pipeline segment ref: COL-PMWS-3002934		City: RIVERSIDE, CA	Street: ACORN ST		
Upstream manhole No: COL-MWS-3001727	Downstream manhole No: COL-MWS-3001674	Material: VCP	Shape: C	Height: 27	Width:

INSPECTION DATA

Scheduled date: 1/4/2018 11:33:48 PM		Start date/time: 1/4/2018 11:43:33 PM	End date/time: 1/4/2018 11:58:16 PM
Length surveyed: 652.9	Status: Stopped	Surveyed by: JACOB ZEIGLER	Work order:
Purpose:	Weather:	Condition:	
Additional info:			

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	No				START WITH FLOW		
0.0	No				AMH		
0.0	No				MWL		
171.2	No		6		DAGS		
240.3	No		2		CL		
240.3	No		10		CL		
289.6	No		10		CL		
289.6	No		2		CL		
293.0	No		12		TFA		
298.4	No		2		CL		
298.4	No		10		CL		
377.2	No		12		TFA		
434.5	No		6		DAGS		

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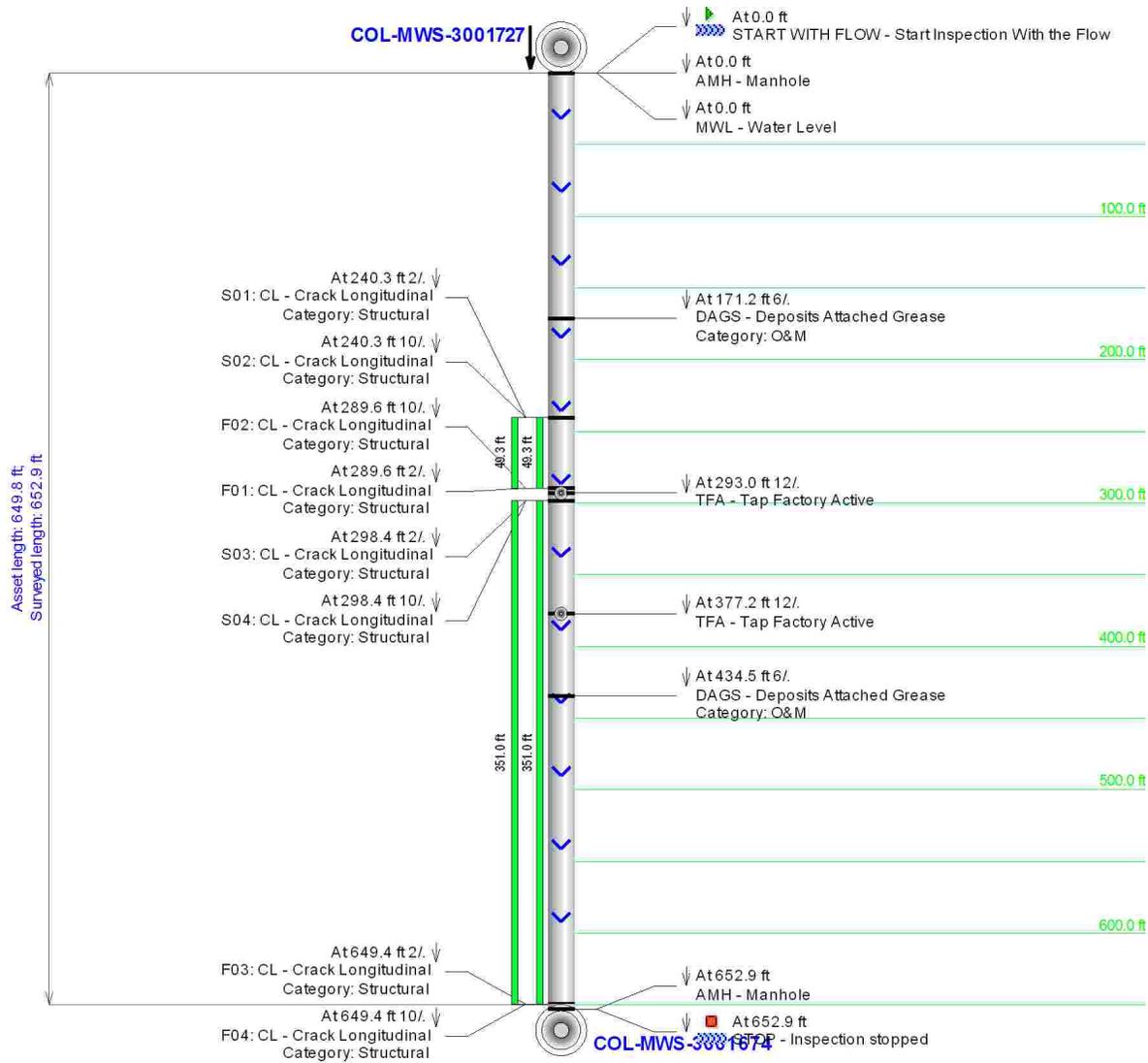


OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
649.4	No			2	CL		
649.4	No			10	CL		
652.9	No				AMH		
652.9	No				STOP		

Main Inspection with Pipe-Run Graph

Project Name: RWQCP		Pipeline segment ref: COL-PMWS-3002934		City: RIVERSIDE, CA		Street: ACORN ST	
Start date/time: 1/4/2018		Width: 27		Material: VCP		Location code:	
Direction: Downstream		Length surveyed: 652.9		Weather:		Media label:	



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PACP Sewer Report

Surveyed by: JACOB ZEIGLER		Certificate No: U-1208-6135		Owner:		Survey Customer		Drainage area:		Sheet number:			
Work order:		Pipeline segment ref: COL-PMWS-3002934		Start date/time: 2018/01/04 23:43		Street: ACORN ST		City: RIVERSIDE, CA					
Location details:						Upstream manhole No: COL-MWS-3001727		Rim to invert:		Grade to invert:		Rim to grade:	
Downstream manhole No: COL-MWS-3001674				Rim to invert:		Grade to invert:		Rim to grade:		Sewer use:		Direction: D	
Flow control:		Height: 27		Width:		Shape: C		Material: VCP		Ln. method:		Pipe joint length:	
Total length: 649.8		Length surveyed: 652.9		Year laid:		Year renewed:		Media label:					
Purpose:		Sewer category:		Pre-cleaning H		Date cleaned: 2018/01/03		Weather:		Location code:		Additional info:	

Starting access point:

Easting:	Northing:	Elevation:	Coordinate system:	GPS accuracy:
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Grade	Amount of Structural Defects	Structural			O&M			Overall Pipe				
		Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index
1	0	0	320	2Z00	2	0	0	4	2200	2	324	2
2	160	320				2	4					
3	0	0				0	0					
4	0	0				0	0					
5	0	0				0	0					

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Observations by Inspections

SITE DATA

Pipeline segment ref: COL-PWS-3003363		City: RIVERSIDE, CA	Street: ACORN ST		
Upstream manhole No: COL-MWS-3001674	Downstream manhole No: COL-MWS-3001672	Material: VCP	Shape: C	Height: 27	Width:

INSPECTION DATA

Scheduled date: 1/5/2018 12:01:53 AM		Start date/time: 1/5/2018 12:02:20 AM	End date/time: 1/5/2018 12:16:10 AM
Length surveyed: 569.4	Status: Stopped	Surveyed by: JACOB ZEIGLER	Work order:
Purpose:	Weather:	Condition:	
Additional info:			

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	No				START WITH FLOW		
0.0	No				AMH		
0.0	No				MWL		
15.1	No		2		CL		
15.1	No		10		CL		
34.7	No		12		TFA		
55.2	No		2		CL		
55.2	No		10		CL		
100.6	No		10		CL		
101.6	No		2		CL		
110.4	No		2		TF		
126.4	No		6		DAGS		
416.6	No		6		DAR		

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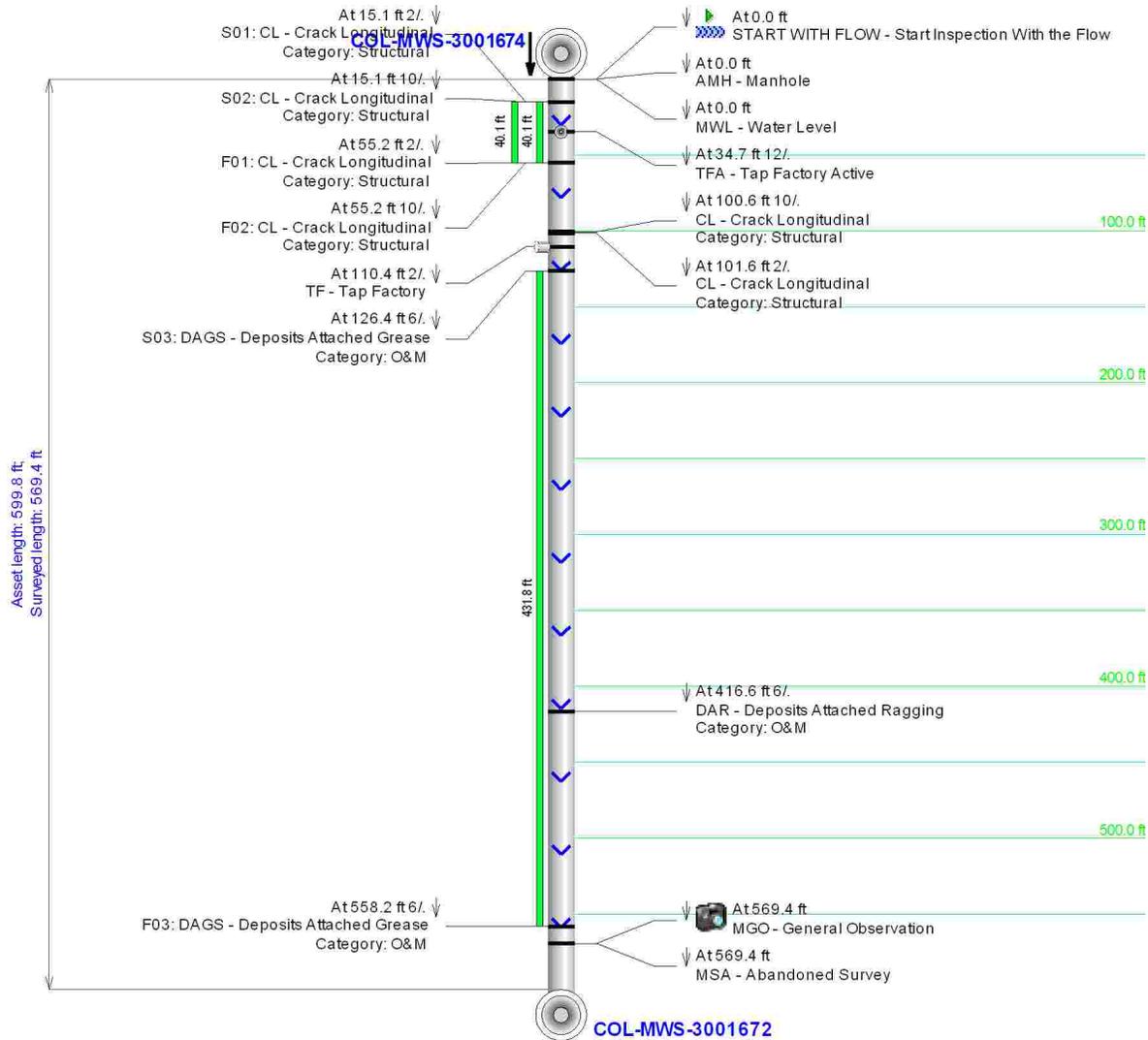


OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
558.2	No			6		DAGS	
569.4	No					MGO	
569.4	No					MSA	

Main Inspection with Pipe-Run Graph

Project Name: RWQCP	Pipeline segment ref: COL-PWS-3003363	City: RIVERSIDE, CA	Street: ACORN ST
Start date/time: 1/5/2018	Width: 27	Material: VCP	Location code:
Direction: Downstream	Length surveyed: 569.4	Weather:	Media label:



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PACP Sewer Report

Surveyed by: JACOB ZEIGLER Certificate No: U-1208-6135 Owner: _____ Survey Customer: _____ Drainage area: _____ Sheet number: _____

Work order: _____ Pipeline segment ref: COL-PWS-3003363 Start date/time: 2018/01/05 00:02 Street: ACORN ST City: RIVERSIDE, CA

Location details: _____ Upstream manhole No: COL-MWS-3001674 Rim to invert: _____ Grade to invert: _____ Rim to grade: _____

Downstream manhole No: COL-MWS-3001672 Rim to invert: _____ Grade to invert: _____ Rim to grade: _____ Sewer use: _____ Direction: D Flow control: _____ Height: 27

Width: _____ Shape: C Material: VCP Ln. method: _____ Pipe joint length: _____ Total length: 599.8 Length surveyed: 569.4 Year laid: _____ Year renewed: _____ Media label: _____

Purpose: _____ Sewer category: _____ Pre-cleaning: H Date cleaned: 2018/01/03 Weather: _____ Location code: _____ Additional info: _____

Starting access point: Easting: _____ Northing: _____ Elevation: _____ Coordinate system: _____ GPS accuracy: _____

Grade	Amount of Structural Defects	Structural			O&M			Overall Pipe				
		Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index	
1	0	0	36	2B00	2	0	0	174	2P00	2	210	2
2	18	36				87	174					
3	0	0				0	0					
4	0	0				0	0					
5	0	0				0	0					

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Observations by Inspections

SITE DATA

Pipeline segment ref: COL-PWS-3003725		City: RIVERSIDE, CA	Street: ACORN ST		
Upstream manhole No: COL-MWS-3001672	Downstream manhole No: COL-MWS-3001675	Material: VCP	Shape: C	Height: 27	Width:

INSPECTION DATA

Scheduled date: 1/5/2018 1:34:47 AM		Start date/time: 1/5/2018 1:38:25 AM	End date/time: 1/5/2018 1:57:12 AM
Length surveyed: 623.8	Status: Stopped	Surveyed by: JACOB ZEIGLER	Work order:
Purpose:	Weather:	Condition:	
Additional info:			

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	Yes				START AGAINST FLOW		
0.0	Yes				AMH		
0.0	Yes				MWL		
29.9	Yes		2		CL		
29.9	Yes		10		CL		
200.1	Yes		6		DSZ		
211.8	Yes		12		TBA		
419.4	Yes		10		CL		
419.4	Yes		2		CL		
525.5	Yes		2		TBA		
572.1	Yes		10		CL		
572.1	Yes		2		CL		
623.3	Yes		6		OBZ		

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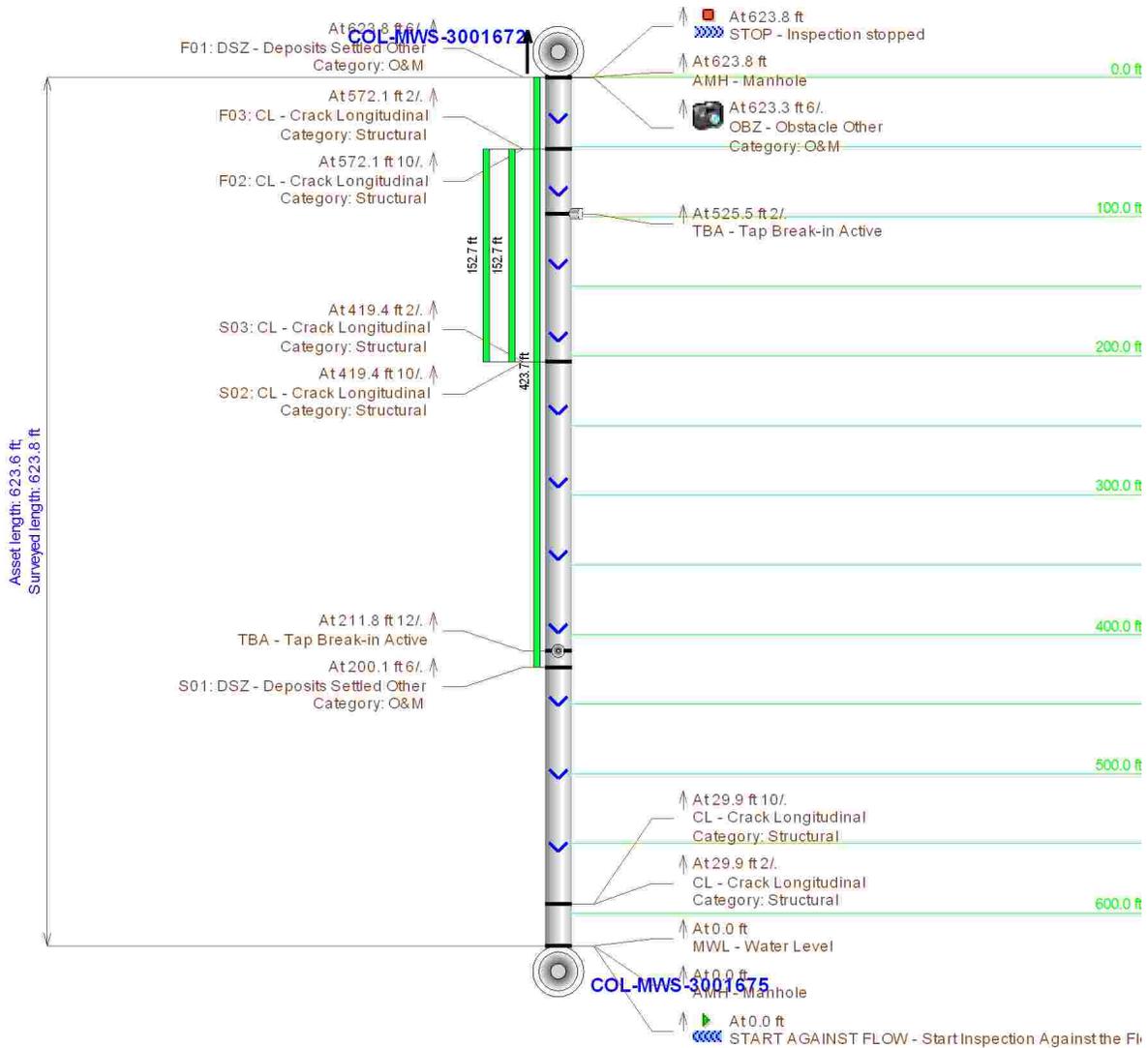


OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
623.8	Yes			6	DSZ		
623.8	Yes				AMH		
623.8	Yes				STOP		

Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	City:	Street:
RWQCP	COL-PWS-3003725	RIVERSIDE, CA	ACORN ST
Start date/time:	Width:	Height:	Material:
1/5/2018		27	VCP
Location code:	Direction:	Length surveyed:	Weather:
	UPSTREAM	623.8	
Media label:			



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PACP Sewer Report

Surveyed by: JACOB ZEIGLER Certificate No: U-1208-6135 Owner: _____ Survey Customer: _____ Drainage area: _____ Sheet number: _____

Work order: _____ Pipeline segment ref: COL-PWS-3003725 Start date/time: 2018/01/05 01:38 Street: ACORN ST City: RIVERSIDE, CA

Location details: _____ Upstream manhole No: COL-MWS-3001672 Rim to invert: _____ Grade to invert: _____ Rim to grade: _____

Downstream manhole No: COL-MWS-3001675 Rim to invert: _____ Grade to invert: _____ Rim to grade: _____ Sewer use: _____ Direction: U Flow control: _____ Height: 27

Width: _____ Shape: C Material: VCP Ln. method: _____ Pipe joint length: _____ Total length: 623.6 Length surveyed: 623.8 Year laid: _____ Year renewed: _____ Media label: _____

Purpose: _____ Sewer category: _____ Pre-cleaning: H Date cleaned: 2018/01/03 Weather: _____ Location code: _____ Additional info: _____

Starting access point: Easting: _____ Northing: _____ Elevation: _____ Coordinate system: _____ GPS accuracy: _____

Grade	Structural			O&M				Overall Pipe				
	Amount of Structural Defects	Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index
1	0	0	128	2K00	2	0	0	258	3P00	3	386	2.573333
2	64	128				0	0					
3	0	0				2	258					
4	0	0				0	0					
5	0	0				0	0					

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Observations by Inspections

SITE DATA

Pipeline segment ref:		City:	Street:			
COL-PWS-3004096		RIVERSIDE, CA	ACORN ST			
Upstream manhole No:	Downstream manhole No:	Material:	Shape:	Height:	Width:	
COL-MWS-3001675	COL-MWS-3001676	VCP	C	27		

INSPECTION DATA

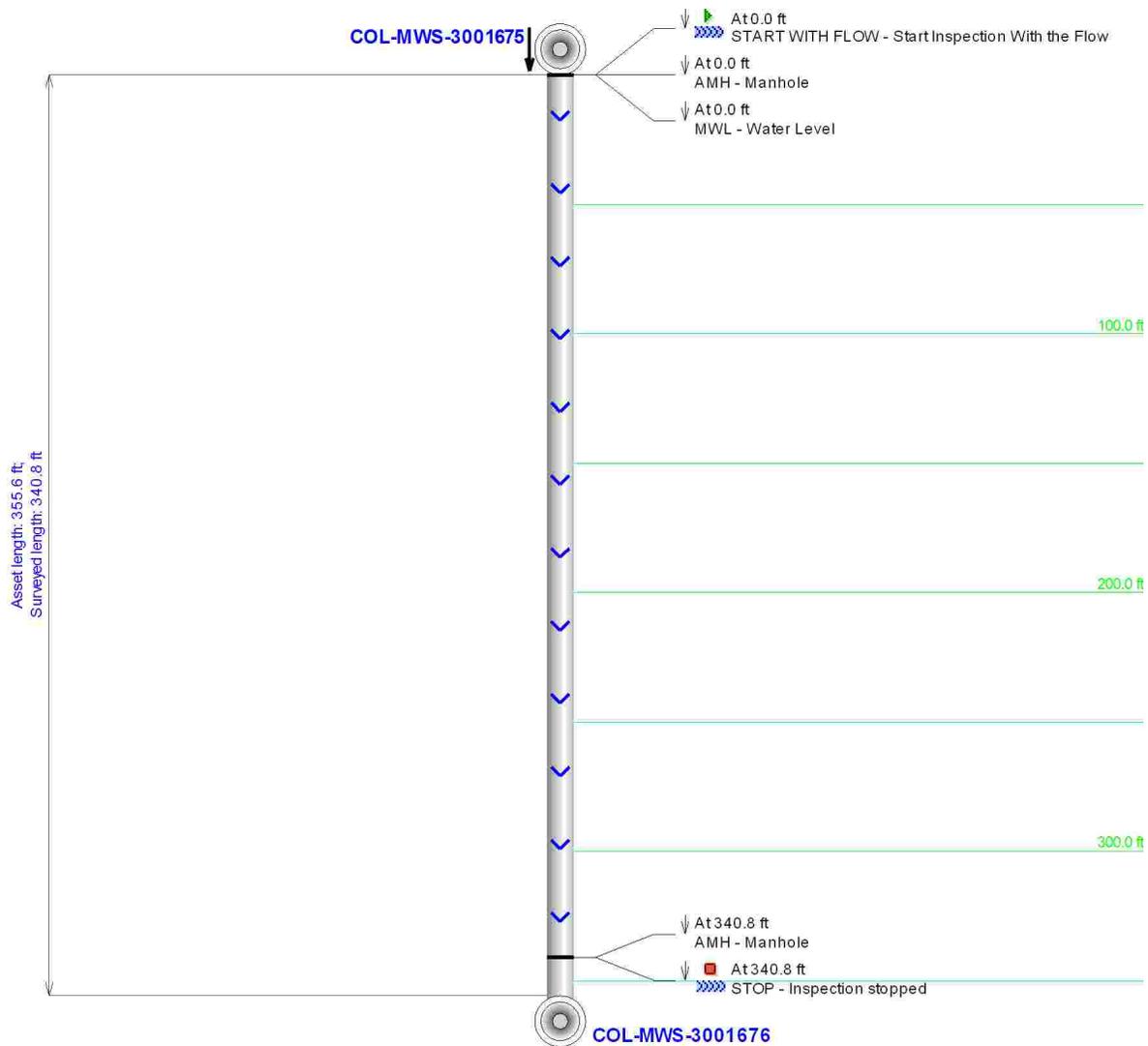
Scheduled date:		Start date/time:		End date/time:	
1/5/2018 12:56:06 AM		1/5/2018 12:58:05 AM		1/5/2018 1:04:27 AM	
Length surveyed:	Status:	Surveyed by:		Work order:	
340.8	Stopped	JACOB ZEIGLER			
Purpose:	Weather:	Condition:			
Additional info:					

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	No				START WITH FLOW		
0.0	No				AMH		
0.0	No				MWL		
340.8	No				AMH		
340.8	No				STOP		

Main Inspection with Pipe-Run Graph

Project Name: RWQCP	Pipeline segment ref: COL-PWS-3004096	City: RIVERSIDE, CA	Street: ACORN ST
Start date/time: 1/5/2018	Width: 	Height: 27	Material: VCP
Location code: 	Direction: Downstream	Length surveyed: 340.8	Weather:
			Media label:



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PACP Sewer Report

Surveyed by: **JACOB ZEIGLER** Certificate No: **U-1208-6135** Owner: _____ Survey Customer: _____ Drainage area: _____ Sheet number: _____

Work order: _____ Pipeline segment ref: **COL-PWS-3004096** Start date/time: **2018/01/05 00:58** Street: **ACORN ST** City: **RIVERSIDE, CA**

Location details: _____ Upstream manhole No: **COL-MWS-3001675** Rim to invert: _____ Grade to invert: _____ Rim to grade: _____

Downstream manhole No: **COL-MWS-3001676** Rim to invert: _____ Grade to invert: _____ Rim to grade: _____ Sewer use: _____ Direction: **D** Flow control: _____ Height: **27**

Width: _____ Shape: **C** Material: **VCP** Ln. method: _____ Pipe joint length: _____ Total length: **355.6** Length surveyed: **340.8** Year laid: _____ Year renewed: _____ Media label: _____

Purpose: _____ Sewer category: _____ Pre-cleaning: **Z** Date cleaned: _____ Weather: _____ Location code: _____ Additional info: _____

Starting access point: Easting: _____ Northing: _____ Elevation: _____ Coordinate system: _____ GPS accuracy: _____

Grade	Structural			O&M			Overall Pipe					
	Amount of Structural Defects	Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index
1	0	0	0	0000	0	0	0	0	0000	0	0	0
2	0	0				0	0					
3	0	0				0	0					
4	0	0				0	0					
5	0	0				0	0					

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Observations by Inspections

SITE DATA

Pipeline segment ref: COL-PWS-3004214		City: RIVERSIDE, CA	Street: RWQCP		
Upstream manhole No: COL-MWS-3001676	Downstream manhole No: COL-MWS-3001677	Material: VCP	Shape: C	Height: 27	Width:

INSPECTION DATA

Scheduled date: 1/5/2018 1:06:00 AM		Start date/time: 1/5/2018 1:06:27 AM	End date/time: 1/5/2018 1:26:08 AM
Length surveyed: 292.3	Status: Stopped	Surveyed by: JACOB ZEIGLER	Work order:
Purpose:	Weather:	Condition:	
Additional info:			

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	No				START WITH FLOW		
0.0	No				AMH		
0.0	No				MWL		
20.7	No		12		RPPD		
23.8	No		9		CL		
38.3	No				MGP		
41.3	No		10		RPPD		
42.5	No		6		OBZ		
44.9	No		6		DAR		
126.1	No		2		TFA		
190.4	No				MGP		
193.6	No		12	12	RPP		
220.0	No		10		TBA		

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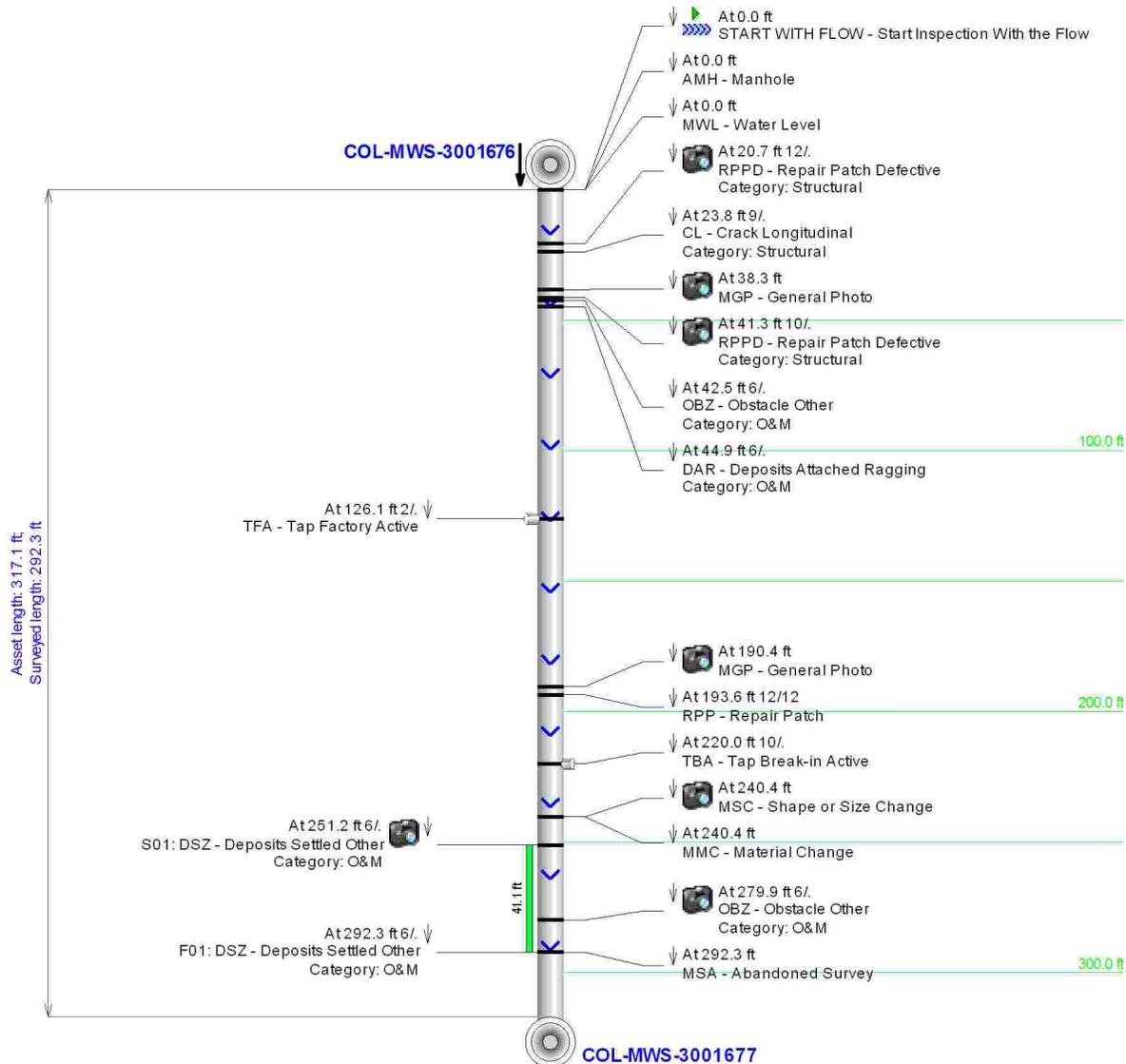


OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
240.4	No				MSC		
240.4	No				MMC		
251.2	No		6		DSZ		
279.9	No		6		OBZ		
292.3	No		6		DSZ		
292.3	No				MSA		

Main Inspection with Pipe-Run Graph

Project Name: RWQCP	Pipeline segment ref: COL-PWS-3004214	City: RIVERSIDE, CA	Street: RWQCP
Start date/time: 1/5/2018	Width: 	Height: 27	Material: VCP
Location code: 	Direction: Downstream	Length surveyed: 292.3	Weather:
		Media label: 	



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PACP Sewer Report

Surveyed by: JACOB ZEIGLER		Certificate No: U-1208-6135		Owner:		Survey Customer		Drainage area:		Sheet number:			
Work order:		Pipeline segment ref: COL-PWS-3004214		Start date/time: 2018/01/05 01:06		Street: RWQCP		City: RIVERSIDE, CA					
Location details:						Upstream manhole No: COL-MWS-3001676		Rim to invert:		Grade to invert:		Rim to grade:	
Downstream manhole No: COL-MWS-3001677				Rim to invert:		Grade to invert:		Rim to grade:		Sewer use:		Direction: D	
Flow control:		Height: 27		Width:		Shape: C		Material: VCP		Ln. method:		Pipe joint length:	
Total length: 317.1		Length surveyed: 292.3		Year laid:		Year renewed:		Media label:					
Purpose:		Sewer category:		Pre-cleaning H		Date cleaned: 2018/01/03		Weather:		Location code:		Additional info:	

Starting access point:

Easting:	Northing:	Elevation:	Coordinate system:	GPS accuracy:
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Grade	Amount of Structural Defects	Structural			O&M			Overall Pipe				
		Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index
1	0	0	10	4221	3.333333	0	0	43	4A31	3.909091	53	3.785714
2	1	2				0	0					
3	0	0				1	3					
4	2	8				3	40					
5	0	0				0	0					

Surveyed by: JACOB ZEIGLER Owner: _____ Start date/time: 2018/01/05 Upstream manhole No: COL-MWS-3001676 Pipeline segment ref: COL-PWS-3004214 Sheet number: _____

Distance (Feet) (Meters)	Video Ref.	Group/ Descriptor	Modifier/ Severity	Continuous Defect	S/M/L	Value		Joint	Circumferential Location		Image Ref.	Family	Rating	Remarks
						Inches (mm)	%		At/From	to				
0.0	6	AMH												3001676
0.0	18	MWL					15							
20.7	106	RPPD							12		RWQCP-COL-M WS-3001676-C OL-MWS-30016 77 RPP at 20.7 ft (D).jpg	S	4	WOOD
23.8	322	CL							9			S	2	
38.3	355	MGP									RWQCP-COL-M WS-3001676-C OL-MWS-30016 77 MGP at 38.3 ft (D).jpg			
41.3	379	RPPD							10		RWQCP-COL-M WS-3001676-C OL-MWS-30016 77 RPPD at 41.3 ft (D).jpg	S	4	WOOD
42.5	401	OBZ					25		6			O&M	4	?
44.9	438	DAR					20		6			O&M	3	
126.1	526	TFA				4			2					
190.4	592	MGP									RWQCP-COL-M WS-3001676-C OL-MWS-30016 77 MGP at 190.4 ft (D).jpg			
193.6	627	RPP							12	12				?
220.0	701	TBA				5			10					
240.4	767	MSC				30					RWQCP-COL-M WS-3001676-C OL-MWS-30016 77 MSC at 240.4 ft (D).jpg			

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Observations by Inspections

SITE DATA

Pipeline segment ref: COL-PWS-3004358		City: RIVERSIDE, CA	Street: RWQCP		
Upstream manhole No: COL-MWS-3001677	Downstream manhole No: COL-NWS-3001931	Material: XXX	Shape: C	Height: 47	Width:

INSPECTION DATA

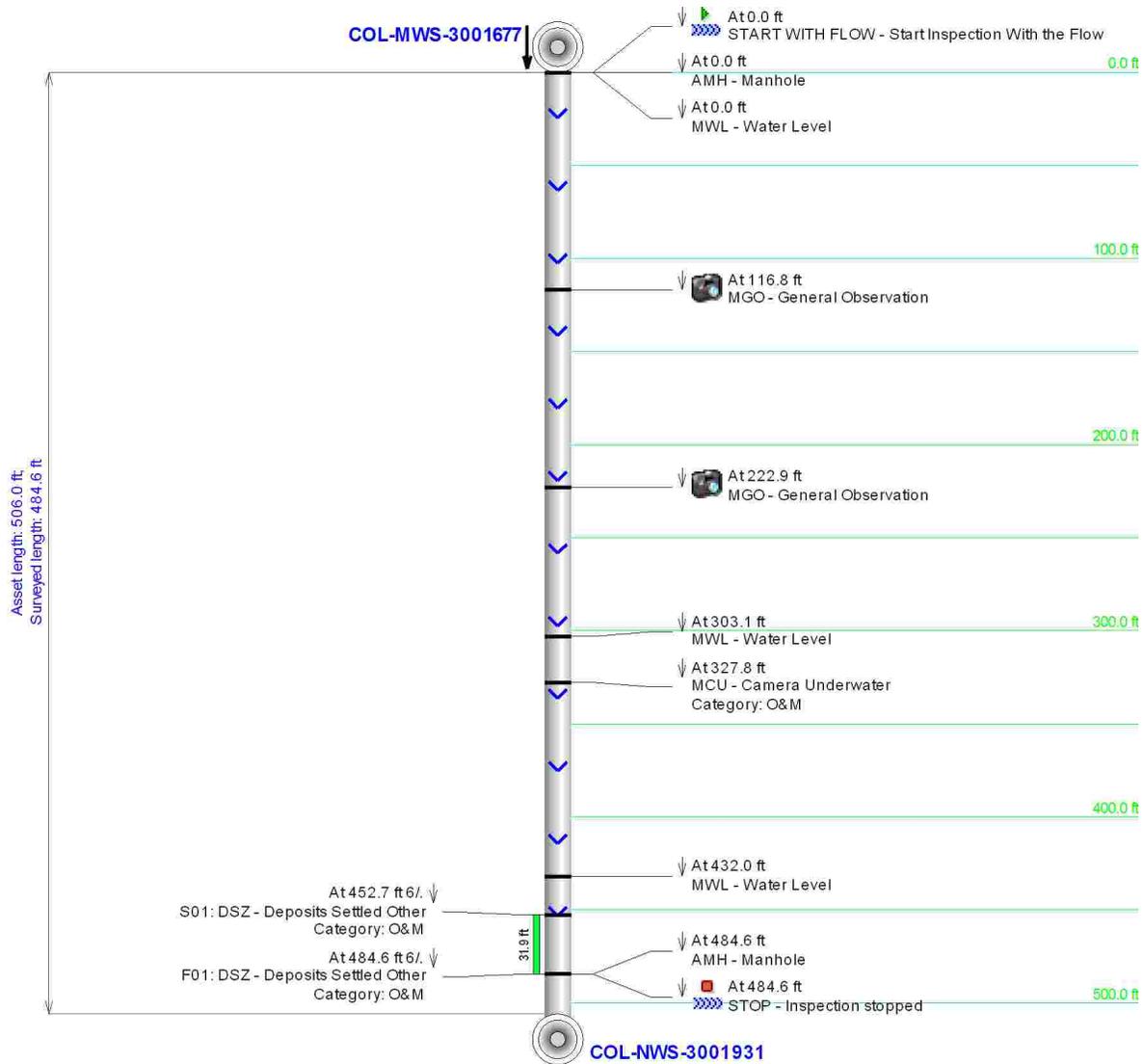
Scheduled date: 1/5/2018 3:15:12 AM		Start date/time: 1/5/2018 3:38:22 AM	End date/time: 1/5/2018 3:52:28 AM
Length surveyed: 484.6	Status: Stopped	Surveyed by: JACOB ZEIGLER	Work order:
Purpose:	Weather:	Condition:	
Additional info:			

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	No				START WITH FLOW		
0.0	No				AMH		
0.0	No				MWL		
116.8	No				MGO		
222.9	No				MGO		
303.1	No				MWL		
327.8	No				MCU		
432.0	No				MWL		
452.7	No		6		DSZ		
484.6	No		6		DSZ		
484.6	No				AMH		
484.6	No				STOP		

Main Inspection with Pipe-Run Graph

Project Name: RWQCP	Pipeline segment ref: COL-PWS-3004358	City: RIVERSIDE, CA	Street: RWQCP
Start date/time: 1/5/2018	Width: 	Height: 47	Material: XXX
Location code: 	Direction: Downstream	Length surveyed: 484.6	Weather:
Media label: 			



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PACP Sewer Report

Surveyed by: JACOB ZEIGLER Certificate No: U-1208-6135 Owner: _____ Survey Customer: _____ Drainage area: _____ Sheet number: _____

Work order: _____ Pipeline segment ref: COL-PWS-3004358 Start date/time: 2018/01/05 03:38 Street: RWQCP City: RIVERSIDE, CA

Location details: _____ Upstream manhole No: COL-MWS-3001677 Rim to invert: _____ Grade to invert: _____ Rim to grade: _____

Downstream manhole No: COL-NWS-3001931 Rim to invert: _____ Grade to invert: _____ Rim to grade: _____ Sewer use: _____ Direction: D Flow control: _____ Height: 47

Width: _____ Shape: C Material: XXX Ln. method: ZZ Pipe joint length: _____ Total length: 506.0 Length surveyed: 484.6 Year laid: _____ Year renewed: _____ Media label: _____

Purpose: _____ Sewer category: _____ Pre-cleaning: Z Date cleaned: _____ Weather: _____ Location code: _____ Additional info: _____

Starting access point: Easting: _____ Northing: _____ Elevation: _____ Coordinate system: _____ GPS accuracy: _____

Grade	Structural			O&M				Overall Pipe				
	Amount of Structural Defects	Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index
1	0	0	0	0000	0	0	0	22	4136	3.142857	22	3.142857
2	0	0				0	0					
3	0	0				6	18					
4	0	0				1	4					
5	0	0				0	0					

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Observations by Inspections

SITE DATA

Pipeline segment ref: COL-PWS-3004543		City: RIVERSIDE, CA	Street: RWQCP		
Upstream manhole No: COL-NWS-3001931	Downstream manhole No: COL-NWS-3001482	Material: XXX	Shape: C	Height: 47	Width:

INSPECTION DATA

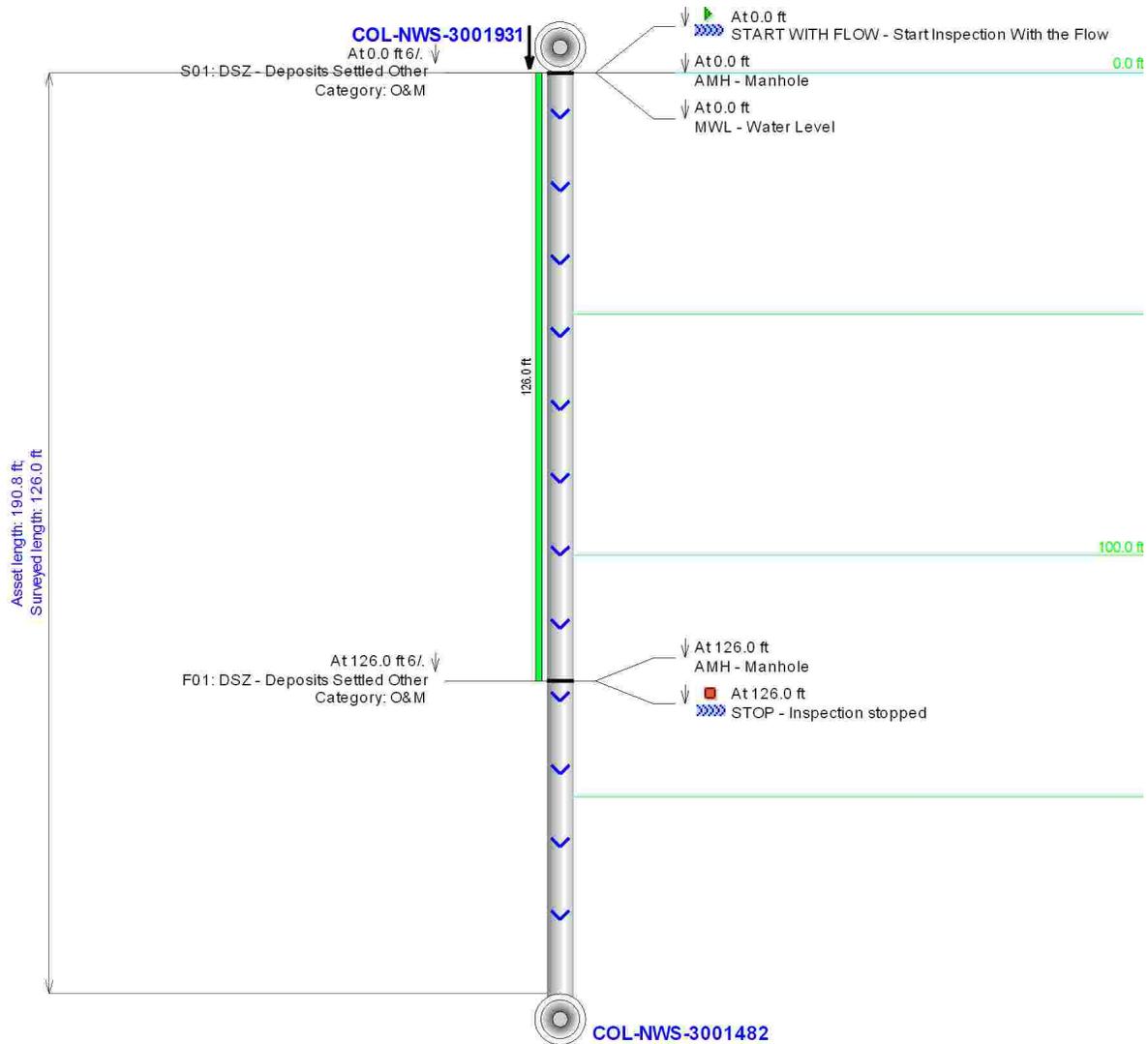
Scheduled date: 1/5/2018 3:55:25 AM		Start date/time: 1/5/2018 3:55:49 AM	End date/time: 1/5/2018 3:59:27 AM
Length surveyed: 126.0	Status: Stopped	Surveyed by: JACOB ZEIGLER	Work order:
Purpose:	Weather:	Condition:	
Additional info:			

OBSERVATIONS

Footage	Rev.	Length	Clock From	Clock To	Code	Modifiers/Severity	Rating
0.0	No				START WITH FLOW		
0.0	No				AMH		
0.0	No				MWL		
0.0	No		6		DSZ		
126.0	No		6		DSZ		
126.0	No				AMH		
126.0	No				STOP		

Main Inspection with Pipe-Run Graph

Project Name: RWQCP	Pipeline segment ref: COL-PWS-3004543	City: RIVERSIDE, CA	Street: RWQCP
Start date/time: 1/5/2018	Width: 	Height: 47	Material: XXX
Location code: 	Direction: Downstream	Length surveyed: 126.0	Weather:
		Media label: 	



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PACP Sewer Report

Surveyed by: **JACOB ZEIGLER** Certificate No: **U-1208-6135** Owner: _____ Survey Customer: _____ Drainage area: _____ Sheet number: _____

Work order: _____ Pipeline segment ref: **COL-PWS-3004543** Start date/time: **2018/01/05 03:55** Street: **RWQCP** City: **RIVERSIDE, CA**

Location details: _____ Upstream manhole No: **COL-NWS-3001931** Rim to invert: _____ Grade to invert: _____ Rim to grade: _____

Downstream manhole No: **COL-NWS-3001482** Rim to invert: _____ Grade to invert: _____ Rim to grade: _____ Sewer use: _____ Direction: **D** Flow control: _____ Height: **47**

Width: _____ Shape: **C** Material: **XXX** Ln. method: _____ Pipe joint length: _____ Total length: **190.8** Length surveyed: **126.0** Year laid: _____ Year renewed: _____ Media label: _____

Purpose: _____ Sewer category: _____ Pre-cleaning: **Z** Date cleaned: _____ Weather: _____ Location code: _____ Additional info: _____

Starting access point: Easting: _____ Northing: _____ Elevation: _____ Coordinate system: _____ GPS accuracy: _____

Grade	Structural			O&M				Overall Pipe				
	Amount of Structural Defects	Structural Segment Grade	Structural Pipe Rating	Structural Quick Rating	Structural Pipe Rating Index	Amount of O&M Defects	O&M Segment Grade	O&M Pipe Rating	O&M Quick Rating	O&M Pipe Rating Index	Overall Pipe Rating	Overall Pipe Rating Index
1	0	0	0	0000	0	0	0	75	3D00	3	75	3
2	0	0				0	0					
3	0	0				25	75					
4	0	0				0	0					
5	0	0				0	0					

